CAIT
Center for Advanced Infrastructure & Transportation
Rutgers, The State University of New Jersey

QUARTERLY PROGRESS REPORT

Project Title:	Operational Improvements at Traffic Circles (Project 2002-16)
RFP NUMBER:	NJDOT RESEARCH PROJECT MANAGER: Robert Sasor
TASK ORDER NUMBER/Study Number: 129 / 4-26544	PRINCIPAL INVESTIGATOR: Kaan Ozbay (Rutgers) / George List (RPI)
Study Start Date: 01/01/2002 Study End Date: 12/31/2004	Period Covered: 2nd Quarter 2004

Task	% of Total	% of Task this quarter	% of Task to date	% of Total Complete
Phase 1: Preliminary Literature Search	5%	50%	100%	5%
Phase 2				
Task 1: Literature Review	10%	25%	100%	10%
Task 2: Selection and Use of Computer Tool.	10%	100%	100%	10%
Task 3: Evaluation of Operational Alternatives.	30%	5%	1.5%	16.5%
Task 4: Safety Evaluation	20%	10%	30%	6%
Task 5: Cost – Benefit Analysis	10%	10%	40%	4%
Tasks 6: Final Recommendations	5%			
Tasks 7: Administration / Final Report.	10%	20%	20%	2%
TOTAL				53.5%

Project Objectives:

Objective 1: Simulation Modeling and Validation of Geometry and Traffic Patterns of Existing and Proposed Operational Improvement Alternatives of Circles Under Study.
Objective 2: Determination and Evaluation of Operational and Safety Improvement Alternatives using a Series of Measures of Effectiveness (travel time, delays, air pollution, gas consumption, etc.)
Objective 3: Recommendation of best operational and safety improvements based on a rigorous and realistic cost-benefit analysis

Project Abstract:

Traffic circles have been used in the United States since 1905. However, their use has been limited since the 1950s due to the realization that they worked neither efficiently nor safely (NCHRP- WEB Page). Recently, there has been increasing interest in improving existing traffic circles to address these safety and efficiency problems. Several States including New Jersey are in the process of exploring effective operational alternatives for enhancing safety and efficiency of these traffic circles built in the early parts of 20th Century.

Many existing traffic circles in New Jersey that were designed to handle lesser traffic volumes than today's volumes fall under this category of traffic circles that need to be improved since they are faced with increasing congestion and accident problems. Although replacement of these traffic circles appear to be a viable option time and money needed for the construction of alternative solutions can be prohibitive especially in this atmosphere of diminishing resources for any kind of major investment due to the budget problems of the State.

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The next best option appears to be the implementation of operational alternatives that can xtend the life of these circles until they can be rebuilt in the next 5 to 20 years.
To study operational alternatives, traffic simulation computer software that can accurately model the geometry & traffic on circles, and provide animated graphics of traffic movements is needed. The major goal of this computer based analysis of the traffic circles as proposed in this study is to accurately evaluate the effectiveness of various traffic engineering measures such as ramp metering, sign and line treatments, reconstructing or adding lanes, in terms of improve traffic flow or safety at a specific circle.

1. Progress this quarter by task:

- **Task 3:** We completed the first phase of data collection at all three circles
  - .Below a summary of our efforts in this quarter:
    - Data extraction is completed for the Asbury circle traffic circle. The extracted data include (i) vehicle counts at every 15 minutes with percentage of trucks and passenger cars, (ii) vehicle inter-arrival times, (iii) vehicle queue wait time before yield signs, (iv) vehicle wait times at yield signs, (v) gap acceptance/rejection times at yield signs.
    - Data collection for the Brooklawn circle is completed. Data collection was performed at Brooklawn circle on April 21th . Data extraction will start next week for this circle.
    - PARAMICS model for the Collingwood circle was calibrated using the traffic counts extracted from the data. Traffic signals have been added to the circle based on the signal timings provided by NJDOT. The calibration for the base year is complete for this circle.
    - Sensitivity analysis for Collingwood circle model both base and proposed scenarios was completed.
    - Also using the API feature of PARAMICS, we have modified the vehicle gap acceptance function based on the extracted data. This modification resulted in more realistic traffic characteristics.
- **Task 4:** RPI team has submitted a technical memo, which explains their approach in assessing the safety improvements in the circle.
  - RPI Team continued to work on analyzing the existing accident data.
  - RPI also continued to work with the Paramics model for the safety analysis.
  - Rebecca Brown, a graduate student from RPI, visited Rutgers on March 28, 29 and 30th. To conduct joint research activities pertaining to the usage of Paramics models for safety. Additional simulation data is provided to RPI for the safety analysis.

- **Task 5:** A draft chapter for the Cost-Benefit analysis is completed. C/B analysis for the Collingwood Circle is also conducted, and included in this chapter.

2. Proposed activities for next quarter by task
   - We will continue Tasks 3, 4 and 5.

3. List of deliverables provided in this quarter by task (product date)
   An interim report on Tasks 3 and 5 – Modeling and calibration Collingwood Circle using Paramics and description of C/B analysis as a methodology and also as applied to Collingwood Circle.

4. Progress on Implementation and Training Activities

Mike Asson was visited on March 10th, March 25th and April 23rd. Paramics software was installed on NJDOT computer, and Collingwood simulation model was copied to that computer for Mike Asson's reviews and feedback. Basic features of Paramics was also demonstrated.
On June 3rd a presentation of the Collingwood circle will be given to NJDOT at Rutgers University.

5. Problems/Proposed Solutions

This quarter our progress was slower than expected mainly due o the very time consuming data analysis, simulation calibration and sensitivity analysis activities. We will also have to go back and collect additional data to support our calibration work. This will be done in the third quarter.

Total Project Budget	$ 422,524
Modified Contract Amount:	
Total Project Expenditure to date	$209,328
% of Total Project Budget Expended	50%

* These are approximate expended amounts for the project; these estimates are for reference only and should not be used for official accounting purposes. For a more accurate project accounting please review the quarterly invoice for this project.